Forest Service

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Subject: Browse Damage to Trees and Shrubs on the Tusayan RD

To: Barbara McCurry, NEPA Planner

This letter briefly describes ungulate browse impacts on vegetation within the boundaries of the Tusayan Wildlife Waters Project, Tusayan Ranger District (RD). Based on observations, many forested areas in the project area have shrubs and young trees less than 10 feet in height that are heavily impacted by ungulate browse. Since cattle have not recently occupied some areas, including where cattle are fenced out of catchment areas, a lot of the damage is assumed to be due to elk browse. In viewing the Grandview Timber Sale area in the mid-1990s with Ed Johnson, District Silviculturist, Randy Smith, Habitat Specialist, Arizona Game and Fish (AZGF), and others, we observed severe damage to ponderosa pine seedlings and saplings, oak saplings, and all species of shrubs, which prevented height growth and resulted in bushy stature (Figure 1). Since that time, browse impacts have been observed in other areas. Most notably, (1) Gambel oak has not been able to recover following death of parent stems by prescribed burns and exists as a low ground cover (Figure 2) and (2) cliffrose has been reduced to mere skeletons due to persistent browsing (Figure 3). In contrast, there are other areas on the District where cliffrose extends beyond 7 feet in height; areas that currently lack developed waters (Figure 4).

Figure 2 Ponderosa pine trees that have been heavily browsed on the Tusayan RD.

Figure 1 Oak sprouts have been repeatedly browsed.

Figure 3 Cliffrose exist as skeletons near artificial water.

Although District staff monitors vegetation conditions on grazing allotments on the District, there is no information available that quantifies the observed impacts of ungulate browse on trees and shrubs. Rocky Mountain Elk (RME) were introduced north of Williams in the 1920s. It took decades for RME populations to expand and grow to their current level; the elk population in Arizona as a whole is believed to be much greater than historic levels[i] [ii] [iii]. The long-term impacts on vegetation from elk and domestic livestock browse are just now being realized and need to be quantified and described in order to aid in determining methods of sustainable vegetative management. Neighboring Grand Canyon National Park, which is used as a safe refuge for elk during the hunting season, is also experiencing severe damage to trees and shrubs (Figure 5)

Figure 4 A more normal sized cliffrose located in a proposed water catchment area.

A decision to disperse elk activity across more area of the District by constructing new artificial water sources, as described in Alternative 2 of the EA, is one action but others could be considered. Other actions could include (1) fencing to protect certain shrub species, such as cliffrose, (2) augmenting natural populations, (3) reducing wild ungulate herds and domestic cattle, and (4) design fences to exclude elk without impeding other wildlife[iv].

Both wild and domestic ungulates are known to create disturbance gradients, called "piospheres", centered on watering sites[v]. Piosphere gradients can be quantified in terms of trail densities, activity levels, dung accumulations, soil compaction, changes in species composition (including non-native species), defoliation, and reproductive output. Although it is estimated that elk stay within one-half mile of a water source, studies are lacking which quantify their impacts to vegetation around that water source. Monitoring both established water catchment areas (distinguishing currently operable from those that are not) and proposed new water catchment areas could quantify ungulate impacts and distinguish impacts caused by elk with those caused by cattle. The sustainability of trees and shrubs in the areas with artificial waters can then be realized.

Figure 5 Elk browsing on juniper in Grand Canyon National Park.

If you have any questions you can reach me at (928) 556-2075, or by email at mfairweather@fs.fed.us.

/s/ Mary Lou Fairweather
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[i] Merriam, C.H. 1890. Results of a biological survey of the San Francisco Mountain region and desert of the Little Colorado, Arizona. North America Fauna 3. Washington, DC: U.S. Department of Agriculture, Division of Ornithology and Mammalogy. 136 p.
[ii] Davis, G.P., Jr. 1982. Man and wildlife in Arizona: the American exploration period, 1824-1965. N. B. Carmony and D.E. Brown (eds.), Arizona Game and Fish Department, Federal Aid to Wildlife W-53-R, 232 pp.
[iii] Arizona Game and Fish. 2007. Hunt Arizona 2007 Edition: Survey, Harvest and Hunt Data for Big and Small Game. Arizona Game and Fish, Information and Ed. Div., Phoenix, AZ.
[iv] VerCauteren K.C., Seward N.W., Lavelle M.J., Fischer J.W., Phillips G.E. 2007. A fence design for excluding elk without impeding other wildlife. Rangeland Ecol manage 60:529-532.
[v] Brooks M.L., Matchett J.R., Berry K.H. 2006. Effects of livestock watering sites on alien and native plants in the Mojave Desert, USA. Jouranl of Arid Environments 67: 125-147.